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UTILIZATION OF OREGON'S LATENT WATERPOWERS

BY JOHN H. LEWIS.

(This article is adapted from a bulletin "Oregon's Opportunity in Industrial Preparedness," prepared by the author as state engineer of Oregon, giving tentative plans and estimates of costs of hydro-electric projects capable of developing over 2,000,000 h. p. for electro-chemical and irrigation purposes and incidentally improving the navigability of the streams.—The Editor.)

For years we have talked in generalities of the great water power possibilities of Oregon and the Columbia River basin. Little thought has been given to the study of any particular project, or how the power of that project could be utilized.

The most logical project to suggest for early construction is at Bonneville, on the Columbia River. Because of its proximity to Portland, the metropolis of Oregon, its location at the head of tide water, and its effect on navigation of the Columbia River as far as The Dalles, where over 1,000,000 electrical horsepower can be had in projects of various sizes, and the necessity for overcoming the swift water between Bonneville and Cascade Locks before the upper power could be utilized in manufacturing products for world markets, it was thought fitting to study this project in some detail.

Much of Oregon's energy has long been devoted to an effort to promote development of agriculture and industries within the state. Promoters of industrial projects have been here in large numbers; they have carefully surveyed the field for their respective industries; they have prepared elaborate prospectuses and presented them with all possible forcefulness to local and eastern capitalists; they have persisted for a few months or sometimes years and have then disappeared from our midst poorer but wiser men, their projects undeveloped and their money spent.

Top—Proposed Power Project at the Cascades of the Columbia River. Bottom—Proposed Dam, Powerhouse and Locks at Bonneville—Cascade Locks in the Distance.

There are good reasons why Oregon has not been able to secure enough industrial development to be worth the mention. Local capitalists have largely accumulated their fortunes through the advance in real estate values and their lack of experience in development or industrial matters makes them timid in financing such enterprises. Often the promoter has not had the mental capacity, business connections, experience and capital to properly present his enterprise to eastern or foreign capitalists; but more often the industries have not been well suited to this locality for lack of raw material or nearby market.

The promotion has been based upon the availability of cheap power, but the vivid picture of the millions of horsepower in "white coal" going to waste in the West has not seemed to impress the cold, calculating financier now engaged in manufacturing in the East. The reason is that, except in a very few industries, the cost of power is not the controlling and not often even an important part of the cost of production.

What should be done? The question is easily answered but not easily executed. We must seek those industries to which the cost of power is the controlling cost or a very important part of the cost of production and whose market is a world market. To secure them we must not only show that we have cheap power, but we must show that it is cheaper than at Niagara Falls and elsewhere. If we cannot show this to be true under existing conditions, then we must so legislate by subsidizing, guaranteeing bond interest, or even, if necessary, by actual public development of power as to make our power compete with other districts by virtue of the cheap interest rates thus made feasible. Public opinion is slow to change. To overcome the fear that private capital is seeking to gobble up and monopolize the water powers of the Northwest, and swing to the other extreme of encouraging development, through perhaps some form of a subsidy, will take time. There may be some grounds for such fear of monopoly in the East. But it will be centuries before any material part of the water power in the Northwest is used, unless we can compete with the world in attracting those comparatively new electro-chemical and electric furnace industries, which use power in wholesale quantities.

By cheap power we mean $8 to $12 per horsepower year delivered in large quantities to industries in the vicinity of the power plant.

When it is remembered that the item of interest is one of the largest when figuring the annual cost of power produced from falling water, the importance of providing for public development can be appreciated. If a market for much of this power can be found, were the annual price per horsepower reduced below what private capital could afford to furnish the same, then it is the duty of the public, with its superior credit to finance the enterprise, just as we are now building a railroad in Alaska to make available for use the extensive coal deposits heretofore inaccessible. We will thus have a split enterprise; the public building and operating the water power plant at a profit, to enable private capital to build and operate various technical enterprises for the utilization of this power at a profit.

We should also assist financially in the experiments necessary to develop and perfect certain chemical manufacturing processes which are now largely experimental but which if technically successful on a large scale give promise of commercial adaptability to local conditions.

Recently a new angle has developed in the power market by virtue of the agitation for "preparedness" for national defense in case of war. The first requirement of preparedness is to be able to make our own explosives, and these require nitrogen compounds almost entirely imported from abroad. In case of war our supply could be easily cut off by a greater sea power and we would be left to our own resources. These nitrogen compounds are made in the electric furnace in Norway, Sweden and to some extent in Canada, while Germany and Austria are depending entirely upon electric made nitrogen for explosives used in the present war. These countries have experimented for years to develop and perfect their processes and have enormous sums invested in the necessary works. They have many men trained to operate these furnaces skillfully, and who are able to instruct others when the need arises for increasing the output for war purposes.

The electricity for making nitrate is nearly always generated by water power. This gives the West a chance to acquire a proportion of this development, for we have more abundant water power than elsewhere. To do so will require adequate broad-minded and constructive legislation, neither that advocated by the conservationist or the exploiter.

In order to secure our share of this prospective development we must be prepared to discuss intelligently the water power resources which we have available and to present their merits at the proper time. We must also be considering the proper legislation to meet the new situation, as well as to meet the fertilizer trade of this and foreign countries which must be developed in conjunction. Nitrates serve for fertilizers in time of peace and explosives in time of war.

One of the uses to which this water power can be put is in pumping water to arid lands. Three hundred eighty thousand horsepower will be required to irrigate 558,000 acres of land lying along the Columbia and Snake Rivers, within a radius of 70 miles from the proposed Umatilla Rapids power project. The average pumping lifts range from 225 to 380 ft. While these lifts are higher than would probably be justified using electric current at prevailing commercial rates, yet with power furnished by the public, say at cost, from projects constructed partly in aid of navigation, they may ultimately be found to be feasible.

The detailed information in the following table was taken from the report of Joseph Jacobs, prepared in connection with the Columbia River power project near The Dalles. The variation in cost per horsepower per irrigation season is due to the fact that transmission costs from The Dalles project are included. With short transmission lines from projects in the vicinity of the land, the cost of power might still further be reduced under favorable conditions. At best, irrigation development through pumping will increase but slowly. Therefore, until such time as some method is found whereby long time payments and low interest rates can be had for the construction of both the power and irrigation projects, it is doubtful if an irrigation loan would prove attractive in financing a large water power development.

One of the most promising markets for our wasting water power resources is in the establishment of the mixed fertilizer industry, and in the making of nitrates for explosives used in munitions of war. The essential conditions for the establishment of such industries are cheap water power, necessary raw re-

Area Susceptible to Irrigation by Pumping in Vicinity of Umatilla Rapids Project.

Location.	Irrigable Acres.	Water Duty Pumpage —Inches.	Average Pumpage—Head in Ft.	Required Pumping Capacity—Sec. Ft.	Approx. Cost of Completed Project—Per Acre.	Annual Cost of Maintenance and Depreciation—Per Acre. A	Annual Cost of Maintenance and Depreciation—Per Acre. B	Price of Power per H.P. per Irr. Season Based on Transmission from The Dalles.	Approximate Motor Capacity—H.P.
Horse Heaven Slope	61,000	38.75	300	593	$61.00	$6.66	$13.43	$9.90	33,400
Berrian Slope of Columbia River	4,300	37.50	367	41	63.00	7.70	14.50	9.80	2,800
Castle Rock, Arlington Slope	150,000	48.50	380	1,820	65.00	10.10	17.21	10.08	130,700
Three Rivers Slope	42,000	41.25	343	435	58.00	8.63	14.98	10.85	28,500
Pasco	80,000	41.25	265	833	50.00	6.59	12.92	10.38	41,700
Benton	109,000	50.00	225	1,438	48.00	7.30	12.60	10.83	61,200
Priest Rapids	112,000	46.25	316	1,369	49.00	9.38	14.02	11.09	82,000
Total	558,300	.....	...	.....	$59.00	.....	.....	.....	380,300

A—Annual cost exclusive of interest, depreciation and taxes, it being not unusual to charge interest and taxes against the land value which is ordinarily assessed to include the value of the irrigation works and to meet depreciation by special assessment when renewals are required.

B—Annual cost, including interest at 6 per cent, taxes at 1 per cent, and depreciation at varying rates, on total cost of irrigation works. From report by Joseph Jacobs in connection with report on Columbia River power project.

sources, and convenient rail and water transportation to the markets of the world.

The market for such products, which can be made largely in the electric furnace, is almost unlimited, if we can successfully compete with other countries. Ordinarily about $500,000,000 worth of fertilizer is consumed annually by the nations of the world. In 1913, when conditions were normal, about $125,280,000 worth of commercial fertilizer was used in the United States. Of this amount, the farmers paid $48,830,000 for nitrogenous substances, $56,000,000 for phosphates, and $20,450,000 for potash salts. Practically all the potash salts were imported from Germany, and the entire quantity of nitrate of soda came from Chile, while some electrically made nitrate of lime was imported from Norway. Phosphates were obtained largely in Florida and other Southern States.

All of these ingredients necessary for the mixed fetilizer industry are found in the Northwest.

Potash can be had from the giant kelp, which grows in beds along the Oregon and Washington coasts. Experts tell us this can be recovered in competition with Germany under ordinary conditions. At the present time, potash is selling at eight to twelve times its normal value. Though a bill authorizing the leasing of kelp beds along the Oregon coast was introduced in the last legislature, no action was taken. At present it is therefore impossible to secure sufficient title to warrant the investment of capital in works for the recovery of potash.

Nitrates can be had from the air through the fixation of atmospheric nitrogen in the electric furnace. It is said that there is enough nitrogen in the air over one square mile of the earth's surface to supply the world for 50 years.

Phosphates can be had from the rich mineral deposits of Idaho and Montana. These deposits are now withdrawn from entry pending legislation by Congress. In 1914, 2,734,000 tons of phosphate rock were produced in the Southern States, about one-half of which was exported to Europe. Not one ton was produced in the Northwest.

In case of war, the United States would be at the mercy of the enemy, if communication with Chile should be shut off. All of our nitrates for explosives now come from this foreign country. During 1912, the world paid Chile $30,000,000 as export duties on nitrates, and we are in this way contributing largely to the support of a foreign government. To build the necessary hydroelectric plants and works to supply our own nitrate needs in case of war would take several years.

One of the first steps in connection with the present program for preparedness should be the building of one or more plants for the manufacture of nitrates in the United States. Such a plant should not be located on the international boundary, as at Niagara Falls, or too near the seacoast to be defended. It should be built by or under the control of the government. At least, one of these plants should be located in the Northwest.

A logical location for such a plant would be at the Cascades of the Columbia River, near Bonneville. At this point, 200,000 continuous electrical horsepower, with an equal amount of secondary, or part time power, can be generated through the construction of a dam to raise the water 44 ft. at low stage. The investment of a relatively small amount of money in test pits and borings to determine foundation conditions and in preliminary designs and estimates would determine the feasibility of this project from an engineering standpoint and its approximate cost.

The federal government could well afford to build this dam in the interest of navigation. If it did not see fit to go into a complicated technical industry, it could install the necessary electrical equipment and lease the power at prices which would induce the construction by private capital for the production of nitrates and commercial fertilizers. In time of war, the production of fertilizers could be discontinued, and all energy generated used in the production of nitrates for explosives.

Government Aid Necessary.

Private capital in the United States is not educated as yet to invest in these complicated technical industries. It is said by those who have studied the situation from a world standpoint that before the war certain French bankers would advance money for nitrate plants in Norway upon a margin of 8 per cent anticipated profits, but that American bankers required a showing of 20 per cent anticipated profits.

The reason for this is that enormous investments of capital must be made in a field comparatively new and untried for our American financiers. The subsequent invention of a new process might immediately

jeopardize such investment. New inventions are constantly being made to perfect present commercial processes, and until such time as capital can be shown that these industries are upon a stable technical footing it will be difficult to secure American capital for such enterprises.

Just as the government assisted in the construction of pioneer railroads, so it appears necessary for the federal government to pioneer to some extent this new field in order to demonstrate the feasibility of these industries technically and commercially.

By selling the power to some industries below cost, to others above cost, according as they are able to pay, it is believed that all the power from the first plant could be disposed of and many new industries started which otherwise could not get a foothold. By having access to the figures of actual cost through public control of the power, it could soon be determined whether or not it would be necessary for the government to continue in this field. It might develop that the profits were so great and permanent that private capital could be found to build not only the technical works, but also the future dams, power houses and locks, thus furnishing improved navigation facilities without cost to the public.

Because of our enormous undeveloped resources, our favorable climate, convenient rail and water transportation, and the possibilities for development through the establishment of a world commerce in fertilizer, it appears that every thinking person in the Columbia River basin should unite in some practical program which will result in making available accurate and reliable information, based on the actual operations of a chemical plant on a commercial scale.

Sweden contributed largely toward the construction of a demonstration electrical iron and steel plant operated by the iron and steel makers' association of that country. The figures as to cost for this experimental plant have been made available to the world. As a result, the electrical iron and steel industry has been established in Sweden, thus saving the iron industry, which was rapidly dwindling in importance, due to the increasing cost of charcoal for the old process.

Besides the fertilizer and nitrate industries, which, from our limited information, appear most promising at the present time, there are many other new industries wherein cheap electrical power is an important factor in the selection of a location. Our own demands for iron and steel may ultimately be met through the importation of ore from China, Mexico and other countries, utilizing the electric furnace for smelting. Enormous electric smelters may ultimately be established to handle the copper, zinc, and other ores, which may be brought as return cargoes. As our population increases, a considerable amount of power will ultimately be disposed of in electric cooking, in electric operation of farm machinery and to some extent for heating of houses, for the operation of pulp and paper mills, woolen mills, furniture factories and other industries with which we are now familiar, as well as in connection with the operation of transcontinental and suburban railroads.

The population of Oregon and the Columbia River basin is small, and the existing markets for hydroelectric power are already oversupplied.

It is stated that "power companies supplying Portland have in operation steam and water power plants that can supply 30,000 horsepower in excess of the present demands of the market." In addition to this, existing companies have water rights initiated for undeveloped power far in excess of this developed power.

The present markets will increase but slowly as population increases, and the present plants are not adequate for chemical manufacturing purposes. Unless we are fortunate enough to secure some of the new industries mentioned above, which use hydroelctric power in large quantities, there is little likelihood that any material part of the water power in the Columbia River basin will be put to use during the life of the present generation. This power must be utilized, if at all, in the manufacture of products which can be shipped to all parts of the world.

Unless these markets materialize the oversupply of this resource may ultimately be found to be a curse; our rivers cannot be tamed. They will continue to flow on to the ocean, a menace to any life and property which ventures to surmount the various rapids. Navigation for only high power boats will be of but little advantage in furnishing cheap transportation to the farmers of the great inland empire. Our arid lands will continue to thirst for the life giving waters, which in some districts can only be supplied by pumps utilizing cheap power. And our much heralded birthright will prove but a mess of pottage.

Summary of Projects Discussed.

	Minimum Primary Capacity Continuous E. H. P.
Columbia River:	
Cascade Project	200,000
The Dalles Project	480,000
Umatilla Rapids	120,000
Deschutes River:	
Deschutes River System	504,000
Metolius River	98,000
Snake River:	
Palouse Rapids	50,000
Asotin	54,000
Coon Hollow	200,000
Cherry Creek	200,000
Mountain Sheep	120,000
Salmon River Tunnel Project	200,000
Addition to Mountain Sheep Project if Salmon River Project is developed	80,000
Rogue River:	
Devil's Stair	12,000
Horseshoe Bend	13,000
Klamath River	70,000
Total continuous E. H. P.	2,401,000

To facilitate reference, a brief summary of the important features in connection with each of the above mentioned projects will here be given:

Columbia River Projects.

Cascade-Columbia Project:

Location—143 miles above the mouth, 42 miles above Portland. This project has a very strategic location at the head of tidewater and of ocean navigation and near the commercial metropolis of Portland. It would also eliminate a very serious and the only obstacle to barge navigation of the Columbia to The Dalles and would open the river to this point for ocean commerce.

River Discharge—50,000 second-feet, minimum.
Head—44 feet.
Power—200,000 continuous electrical horsepower.
90,000 E. H. P. surplus for 11 months.
120,000 E. H. P. surplus for 10 months.
220,000 E. H. P. surplus for 8 months.

420,000 E. H. P., total possible capacity available for 8 months or more.

Capital Cost—Exclusive of dam, about $11,000,000; insufficient data available for estimate of dam.

The Dalles-Columbia Project:

Location—4 miles above The Dalles; 190 miles from the mouth of the river.

River Discharge—50,000 second-feet, minimum.

Head—105 feet at 50,000 second-feet, decreasing to 45 feet in limiting flood.

Power—480,000 primary continuous E. H. P.
120,000 surplus continuous E. H. P. for 11 months.
100,000 surplus continuous E. H. P. for 10 months.
100,000 surplus continuous E. H. P. for 8 months.
800,000 total continuous E. H. P. available 8 months or more.

Capital Cost—$50,000,000.

Projects on the Deschutes and Metolius Rivers.

The Deschutes River and its principal tributary, the Metolius River, offer many sites for power development, some of which are remarkably cheap in first cost. There are no large concentrated falls, all developments either contemplating a dam for the full height of the head developed and enough more to reach good foundation, or in one or two cases a low dam and diversion canal with flume or tunnel for recovery of the remaining head. Nevertheless some of the projects are very low in first cost. All estimates have been based upon gravity concrete dams, the estimates of the first two projects including $10 per electric horsepower for lands and right of way, and the remaining projects $5 per electric horsepower for this purpose.

Summary of Deschutes and Metolius River Power Projects.

Powersite.	Miles from Columbia River.	Head.	Flow—Sec. Ft.	Horsepower.	Total Cost, Including Right of way.	Cost per Horsepower.
Deschutes R. Sites:						
Moody	3	132	4,500	54,000	$4,560,000	$ 84.45
Lockit	14	70	4,500	28,630	1,901,000	66.41
Reclamation..	20	92	4,500	37,600	2,328,000	61.91
Sinamox	29	87	4,500	35,600	1,778,000	49.94
Oak Brook...	37	65	4,500	26,500	1,610,000	60.75
Sherar Falls.	44	100	4,500	40,900	3,742,000	91.30
Oak Springs.	49	32	3,700	10,820	1,254,000	115.87
Maupin	53	132	3,700	44,500	4,472,500	100.65
Freida	63	140	3,700	47,360	4,716,800	99.59
White Horse Rapids	77	138	3,700	47,200	3,039,000	64.38
Coleman.....	89	58	3,700	19,680	1,840,400	93.00
Mecca	98	90	3,400	27,760	1,878,800	67.68
Pelton	107	60	3,400	18,560	1,052,800	56.72
Metolius	111	210	3,400	64,960	3,954,800	60.88
Metolius R. Sites:						
Riggs		135	1,400	17,200	1,626,000	94.53
Whitewater .		260	1,200	28,360	2,115,800	74.60
Jefferson Cr'k ..		400	1,000	36,360	2,751,800	75.67
Jack's Creek.. ..		300	600	16,360	2,781,800	170.00

Total horsepower, Deschutes River sites, 504,070.

Total horsepower, Metolius River sites, 98,280.

Umatilla Rapids Project.

Location—3 miles above Umatilla, and 290 miles above mouth of Columbia River.

River Discharge—40,000 second-feet, minimum.

Head—35 feet.

Power—120,000 E. H. P., continuous.
320,000 E. H. P. for irrigation season.

Capital Cost—$20,500,000 for 320,00 E. H. P.

Snake River Projects.

The proposed Snake River projects in general involve the construction of dams to the full height of the head to be utilized and enough more for foundation purposes.

The Snake River canyon is generally narrow and steep and is cut into a basaltic lava formation. Two lower projects in Washington are discussed chiefly because of their relation to improving navigation to the larger sites above, and because of the possibility of selling sufficient power for irrigation or other purposes to finance the improvement of navigation.

Palouse Rapids Site:

Location—7 miles below Riparia, Wash.

River Discharge—12,000 second-feet, minimum.
17,000 second-feet with storage.

Head—32 feet.

Power—50,000 E. H. P. (greater than minimum because irrigation load comes during high water.)

Capital Cost—$4,500,000 or $90 per E. H. P.

Asotin Project:

Location—Above Asotin, Wash.

River Discharge—10,000 second-feet, present minimum.
15,000 second-feet with storage.

Head—60 feet.

Power—54,000 E. H. P., minimum.
80,000 E. H. P., with storage.

Capital Cost—$5,400,000 or $100 per E.H.P. for 54,000 E.H.P.
$6,600,000 or $82.50 per E.H.P. for 80,000 E.H.P.

Coon Hollow Project:

Location—On Snake River, 45 miles above Lewiston, Idaho, and 5 miles south of the northeast corner of Oregon.

River Discharge—10,000 second-feet, minimum.
15,000 second-feet for an average of 11 months per year.

Head—200 to 220 feet.

Power—200,000 E. H. P., continuous.
300,000 E. H. P., for 11 months.
300,000 E. H. P., continuous with possible use of existing storage.

Dam—Gravity concrete.

Capital Cost—$15,200,000 for 200,000 E. H. P. development or $76.00 per E. H. P.

Annual Cost of Generation—$5.90 with 80 per cent of power sold.

Cherry Creek Project:

Location—On Snake River, 51 miles above Lewiston, Idaho, and below the mouth of Salmon River.

River Discharge—Same as Coon Hollow.

Head—200 feet.

Power—200,000 E. H. P., minimum.
300,000 E. H. P., with storage.

Capital Cost—$13,600,000 for 200,000 E.H.P. or $68 per E.H.P.
$18,100,000 for 300,000 E. H. P. or $60.35 per E. H. P.

Mountain Sheep Project:

Location—On Snake River, 55 miles above Lewiston, Idaho, and 3 miles above the mouth of the Salmon River.

River Discharge— 6,000 second-feet, minimum.
10,000 second-feet, with addition of Salmon River through diversion tunnel or by storage as for Coon Hollow project.
15,000 second-feet, minimum with both Salmon River and storage water.

Head—200 to 220 feet.

Power—120,000 continuous electrical horsepower.
200,000 continuous electrical horsepower with either storage or Salmon River diversion.
300,000 E. H. P., with both additional sources.

Dam—Concrete arch.

Capital Cost—$14,000,000 for 200,000 E.H.P. or $70 per E.H.P.
$16,400,000 for 300,000 E. H. P. or $54.70 per E. H. P., assuming Salmon River project to have been developed without cost to this project.

Salmon River Tunnel Project:

Location—30 miles southwest of Grangeville, Idaho, a railroad terminus, 80 miles above Lewiston, Idaho.

Works—Diversion dam 150 feet high on Salmon River near Freedom, Idaho; water carried by canal and 7-mile tunnel through mountain to power house on Snake River.

River Discharge—4,000 second-feet, usual minimum.

Head—505 feet to 530 feet, net.

Power—200,000 E. H. P., continuous.
100,000 E. H. P., additional, April to October.

Capital Cost—$19,215,000 or $96.08 per E. H. P. for 200,000 E. H. P.
$25,320,000 or $84.40 per E. H. P. for 300,000 E. H. P.

Rogue River Developments.

Devil's Stair Damsite:

Location—About 3 miles west of east line of Curry county and about 35 miles northwest of Grants Pass.

River Flow—1,350 second-feet, minimum.

Head—100 feet.

Power—12,000 E. H. P., continuous.
30,000 E. H. P., peak at 40 per cent load factor.

Capital Cost—$2,100,000 or $70 per E.H.P. for 30,000 E.H.P.

Horseshoe Bend Damsite:

Location—On Rogue River, about 5 miles east of west line of Josephine county.

River Discharge—Same as for Devil's Stair Site.

Head—110 feet.

Power—13,100 E. H. P., continuous.
30,000 E. H. P., at 43 per cent load factor.

Capital Cost—$1,700,000 for 13,100 E.H.P. or $130 per E.H.P.
$2,100,000 for 30,000 E.H.P. or $70 per E.H.P.

Klamath River Power Project.

Location—About 25 miles southwest of Klamath Falls.

Works—2½ miles of tunnel and 8 miles of concrete lined canal.

River Discharge—1,160 second-feet.

Head—700 feet net.

Power—70,000 E. H. P.

Capital Cost—$6,400,000 or $91.50 per E. H. P.

This will conflict with a large proposed irrigation project in California. Part of the water supply will be stored in Klamath Lake, which is navigable and under federal control. Here, again, we are confronted by interstate and federal questions, just as for the water power projects on the Columbia and Snake Rivers.

ELECTRIC COOKING IN A CAFETERIA.

BY B. E. HANNON.

(Details are here given of the electric equipment of a successful cafeteria where all cooking is done electrically. This desirable load for a power company was obtained in competition with gas at $1.00 per 1000 cu. ft. and with distillate, the chief factor in the decision, being a saving of $90 per month in lessened shrinkage of meat. The author is manager of the Sacramento district of the Great Western Power Co.—The Editor.)

The Quaker cafeteria at Sacramento, California, occupies a one-story building, 80 ft. by 80 ft., built especially for it. It is provided with a sprinkling system on the roof for cooling in the summer, besides having a rather elaborate heating and ventilating system. The dining room is 60 ft. by 80 ft. and has a seating capacity of 250. The interior is all done in white with blue trimmings. One of the novelties in the furnishings is the expensive Brussels carpet which covers the entire dining room, instead of the usual tile floor.

The serving counter, which extends along the rear wall, is 45 ft. by 27 in. The steam table, 16 ft. long, is in the middle of this counter and contains: 7 entree pans (12 in. by 15 in.), roasting pan (16 in. by 16 in), 6 vegetable pans (12 in.), 6 gravy and soup bowls (8 in.), 3 hot bread pans (23 in. by 13 in.). This steam table which is lagged with two-inch magnesium block, contains 180 gallons of water which is maintained at a temperature of 212 deg. by six Simplex circulating water heaters with a total capacity of 8.75 kilowatts. These heaters are at present operated continuously but there is to be a time switch provided to keep them off the peak load.

For breakfast the following portable equipment is used on the counter: 1 egg boiler, 1 egg poacher, 1 toaster, 1 18 by 18 grid for frying bacon and eggs, 1 18 by 18 grid for hot cakes, 2 4 in. Simplex waffle irons.

One of the features of the serving counter is the butter refrigerator. This refrigerator contains twenty tin trays on which are placed twenty butter pans, making a total of four hundred servings of butter. These pans are taken from the refrigerator and placed on the counter as needed, in that way doing away with the usual bowl of ice.

The equipment in the kitchen consists of:

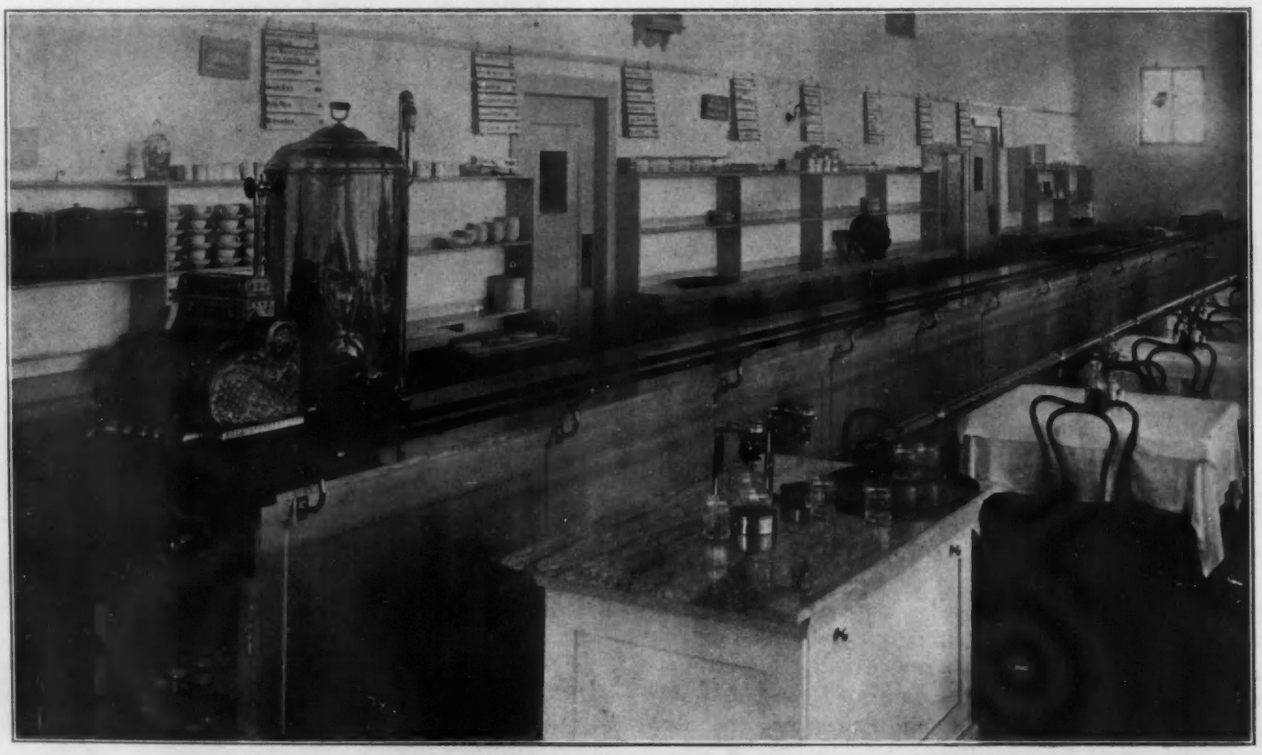
One No. 215 Hughes bake oven used exclusively for pastries handles the following material per week: 500 pies, 60 3-layer cakes, 105 pans (23 by 13) hot bread (40 orders each), 15 pans short cake, 45 loaves nut bread (2 lb.) 250 cup custards, 600 baked apples, 250 apple dumplings, 35 puddings.

The baker also has a No. 24 Hughes range for heating milk and making frostings, and a Simplex 12 in. fry kettle for frying doughnuts.

A No. 175 Hughes bake oven is used for meats and turns out the following per week: 280 lb. rib roast, 60 lb. lamb, 40 lb. pork, 210 lb. stew, 100 lb. hash, 50 lb. bacon, 30 lb. ham, 50 lb. hamburger, 15 lb. meat loaf, 90 lb. turkey, 75 lb. chicken, 50 lb. duck, 450 lb. fish, 800 lb. roast potatoes. 100 lb. beans, 100 lb. macaroni.

A 16 hole Hughes range (15 ft. by 3½ ft.), having six 12 in. 4. kw. open-type elements, six 9 in. 2000 watt, four 9 in. 1500 watt elements, and four 18 by 18, three-heat grids, used for frying and keeping the food warm after it is taken out of the oven.

On account of the great weight of the kettles and pans the severe usage to which the range is subjected, we found it necessary to cover these elements with cast iron grids. These grids are slotted to obtain both radiated and conducted heat.



Electrically Heated Steam Table.

Electrically Equipped Kitchen.

The warming closet for the dishes is 4 ft. by 2 ft. by 5½ ft., and is heated by two 1100 watt, three-heat, units.

There is an automatic dish washer operated by a ½ h.p. motor for the china dishes. Besides this there are three ordinary dish tubs for the pots and pans. They use approximately 1500 gallons of hot water at 160 deg. temperature per twenty-four hours.

The potato peeler and food chopper are both operated by 1 h.p. motors.

The two-ton refrigerating machine is driven by a 3 h.p. motor.

The total equipment consists of:

Range	53.0 kw.	
Pastry oven	10.5 kw.	
Meat oven	6.5 kw.	
Small pastry range	5.0 kw.	
Fry kettle	2.0 kw.	
2 waffle irons	2.0 kw.	
Toaster	3.5 kw.	
Egg boiler	2.5 kw.	
Egg poacher	2.0 kw.	
2 griddles	7.0 kw.	
Warming oven	2.2 kw.	
	96.2 kw.	
Water heaters on steam table	8.75 kw.	
Motors	4.5 kw.	
Sign and outside lights	2.5 kw.	
Inside lights	4.0 kw.	
	19.75 kw.	115.95 kw.

All cooking equipment is metered with a maximum demand meter and separate meters are provided for motors (3-phase), inside lights, sign and outside lights. The water heater operates on a flat rate.

The maximum demand of the cooking equipment is about 55 kw. with a load factor of 30, based on 730 hours per month. The revenue from the cooking equipment is about $190.00 per month. The total revenue, including motors, steam table and lights, is about $300.00 per month.

Kilowatt hours per meal, .623; No. meals served per month, 20,000. Total cost per meal, $.0121.

The following help is employed: 1 cashier, 1 checker, 1 floor girl, 4 buss boys, 1 linen checker, 1 supply boy, 8 girls behind steam table, 2 cooks, 1 baker, 1 salad maker, 7 helpers in the kitchen, 1 porter and night watchman.

Besides Messrs. Swannell and Parker, president and secretary of the Cafeteria Company, respectively, there is one man in charge of the dining room and one in charge of the store room.

There was a fire-proof vault built in the basement of the building in which two 50 k.v.a. transformers were installed in order that the voltage drop be as small as possible.

As the result of the successful operation of this cafeteria the Great Western Power Company has already sold a 550 loaf (62 kw.) bake oven to the largest bakery in town and if it proves satisfactory, will sell two more of the same size. All of the bakers in the city are watching the ovens with a great deal of interest and we feel sure that this bake oven load will soon be one of our greatest revenue producers.

A merger of the Southern California Edison Company and the Pacific Light & Power Corporation is reported to have occurred at Los Angeles.

FEASIBILITY OF WESTERN ELECTRO-METALLURGY.

BY DORSEY A. LYON AND ROBERT M. KEENEY.

Present Commercial Status of Electro-metallurgy.

(Continued.)

Ferro-alloys. The growth of the ferro-alloy industry in Europe has been rapid since 1899, but comparatively slow in the United States. There are about 25 plants engaged in the manufacture of ferro-alloys by the electric furnace method as compared with two plants making the alloys in the electric furnace in the United States. There is, however, an electric furnace ferrosilicon plant in Canada at Welland, Ontario.

There are several reasons why the growth of this industry has been more slow in America than in Europe. Hydroelectric power is not as cheap here and not so favorably located, for the receipt of raw material and the sale of product. The water power sites can not be developed so cheaply as many of the foreign sites where the cost of electric power per horse power year varies from $7 to $15 as compared with $15 to $30 in the United States. This refers to power delivered at the manufacturing plant transformers. In Canada power is somewhat cheaper, but is often located in inaccessible places. Most of the Norwegian and Swedish plants are located on tidewater or navigable rivers. French works are within a couple of hundred miles of Marseilles. The use of ferro-alloys in the manufacture of high class steels did not advance as rapidly in the United States as in Europe, and owing to less favorable natural advantages, electrochemical and electrometallurgical industries in general have not had so rapid progress and growth.

A large proportion of the ferro-alloys used in the United States are imported, as, although there is a duty, local manufacturers do not supply the whole demand. About one-half of the ferromanganese and one-half of the ferrosilicon used in the United States are imported, as well as a large part of the ferrotungsten. More ferrotitanium and ferrovanadium are manufactured here than abroad. The ferrochrome production just about supplies the local demand.

In Europe the industry of manufacture of ferro-alloys in the electric furnace is in excellent condition commercially with the demand for alloys steadily increasing. Because of the large navies built by European countries, there has been a great demand for ferrochrome. The sale of ferro-alloys in Europe, especially ferrosilicon and ferrochrome, is accomplished by the various plants combining in a syndicate with each plant receiving a portion of the total market demand according to arrangement.

In the United States, the Titanium Alloys Manufacturing Company has a plant for the production of ferrotitanium at Niagara Falls, N. Y. The electrometallurgical Company has plants at Knawha Falls, West Virginia, and another at Niagara Falls, N. Y. This company makes ferrosilicon, ferrochrome, ferrotungsten, ferrovanadium, ferromolybdenum and ferrophosphorus. The Primos Chemical Company, Primos, Pa., manufactures metals and ferro-alloys by chemical methods or in combustion furnaces. Among its products are ferro-tungsten, ferrovanadium, tungsten metal, ferromolybdenum, ferrochrome, ferronickel and ferroboren. The American Vanadium Company manufactures ferrovanadium by a method similar to the thermit process at Bridgewater, Pa. The Goldschmidt Thermit Company has a plant for the manufacture of metals and ferro-alloys by the thermit process at Newark, N. Y., but imports most of its products from its foreign works. This company produces ferrotitanium, ferrovanadium, ferromolybdenum, ferrosilicon, ferrochrome and chromium as well as other metals and alloys. It has been recently reported that the Noble Electric Steel Company was about to begin the manufacture of ferromanganese at its electric furnace plant at Heroult, California, and possibly ferrochrome.

Imports of ferro-alloys into the United States during the year ending June 30, 1913, were as given in the table below. The rates of duty were those in force previous to the passage of the present tariff. Under the present tariff all duties were reduced considerably, in most cases being made 15 per cent ad valorem. Hence it may be reasonably expected that imports will increase if the steel business is good at some time in the future.

	Rate of Duty. per ton.	Quantity. tons.	Value.	Value per Unit.
Ferromanganese	$2.50	$128,136.55	$5,484,829	$42.80
Ferrosilicon (over 15 per cent silicon)	20%	9,257.18	574,494	62.06
Chromium and ferrochrome, value $200 per ton or less	25%	459.09	53,624	116.80
Value more than $200 per ton	20%	68.29	35,667	563.55
Ferrophosphorus, value $200 per ton or less	25%	81.38	3,689	45.33
Molybdenum and ferromolybdenum, value more than $200 per ton	20%	7.00	15,939	3187.80
Titanium and Ferrotitanium, value $200 per ton or less	25%	7.00	305	43.71
Value more than $200 per ton	20%	19.21	9,213	479.59
Tungsten and ferrotungsten, value more than $200 per ton	20%	654.30	795,467	1215.75

Pig Iron. The introduction of the electric furnace for smelting iron ore is of advantage only in localities where charcoal and coke are expensive and electric power cheap. The electric furnace consumes one-third of the carbon used by the blast furnace in the manufacture of pig iron, and hence its use may be advantageous where coking coal is scarce and charcoal expensive. In considering electric smelting of iron ores with regard to its commercial status at the present time, it must be remembered that the electric furnace is in this case competing directly with the blast furnace product regardless of its location due to the cheapness of water haulage. It is not like the aluminum or ferro-alloy industry, where the electric furnace has the field to itself, because of its technical and commercial superiority over any combustion process. Hence, in proportion to the amount of pig iron produced, we can not expect to show nearly as large a rate of increase for the electric furnace process as in the case of aluminum and ferro-alloys.

That the electric furnace has been successful in the smelting of iron ore in those districts which are favorable to the same is shown by the fact that ten furnaces of the Trollhattan type and one of the Helfenstein type with a total power capacity of about 40,000 h.p. are in operation in Sweden. In this country there is one electric furnace pig iron plant of two

furnaces with a total capacity of about 7000 h.p. in operation at Heroult, California. As previously stated, the California furnaces are of the rectangular type. While electric smelting of iron ore has been technically successful at Heroult, it does not appear to have been as successful commercially as in Sweden due to the cost of reducing material, i.e., both charcoal and coke. Although the electric furnace uses only one-third of the coke or charcoal that the blast furnace uses, on the Pacific Coast of the United States all solid reducing agents are so scarce and expensive that it appears to be the great problem of electric smelting as well as of blast furnace smelting of iron ores. Attempts have been made to use oil, but these have not yet proven very successful.

While advances in electric smelting of iron ore have been satisfactory considering that its field of use is limited, the actual tonnage capacity of electric pig iron furnaces is small. This is quite clear when it is remembered that the total erected capacity in power consumption of electric iron smelting furnaces, 47,000 h.p., would produce about the same amount of pig iron per day as one modern blast furnace of 450 tons output per 24 hours.

Steel. In 1904 there were four electric furnaces being used in Europe for the manufacture of steel, whereas today there are 114 electric furnaces producing steel in Europe and the United States and 30 others are in course of construction. As in other electrothermic processes, development has not been so rapid in the United States as in Europe. Only 14 furnaces are in use in this country. The average capacity per charge of the furnaces already built is 3.7 tons, whereas that of the furnaces under construction is 4.5 tons, an increase of 21.6 per cent. The total charge capacity of the furnaces now installed is about 250 tons per charge, and the total charge capacity of the furnaces under construction will be 170 tons per charge. The arc furnaces vary in capacity from 1 to 15 tons and require from 200 to 1500 kw. for operation. A Heroult furnace of 25 ton capacity, requiring 3000 kw., is nearly completed at Bruckhausen, Germany. The induction furnaces vary in capacity from 1 to 10 tons and require from 165 to 600 kw. for operation.

Of the 114 furnaces in operation 84 are arc furnaces and 30 are induction furnaces, of the 30 under construction 26 are arc furnaces and 4 induction furnaces.

The accompanying table gives the annual production of steel in electric furnaces by countries for the years 1908 to the first half of 1912.

From Table 1 it may be seen that for a new process in so conservative an industry as iron and steel manufacture progress has been very rapid since 1908. Germany leads all countries in the steady growth of the process and the total tonnage produced. Although in Germany the production of electric-furnace steel increased 67.8 per cent in 1911, in the United States it decreased 44.2 per cent. The decrease in this country was probably due to the conservatism of American steel makers, which has prevented the wide adoption of the process before experimental results have conclusively proved its merits. From present indications there will be a considerable increase in the production of electric-furnace steel in this country in the near future, although a very small tonnage, 6882 tons, was reported by the American Iron and Steel Institute as the output for the first half of 1912. Of the total production of electric-furnace steel in the United States in 1911, 27,227 tons were ingots and 1878 tons castings. Of the total tonnage of electric-furnace steel made here in 1911, 6700 tons were alloy steel and 462 tons were rolled into rails. The large production of steel in the United States and Germany in proportion to the number of furnaces operating is due to the use of molten Bessemer and open hearth steel instead of cold scrap. The use of the latter almost entirely accounts for the comparatively small tonnage produced by France in proportion to the number of furnaces in operation. No figures were obtained for England, but it is probable that at least 10,000 tons of electric-furnace steel is manufactured in England. It is estimated that about 12 furnaces operate there, several of which receive hot-metal charges. Italy, Norway, Switzerland, Belgium and Russia produce small tonnages also. The slight increase in the total electric-furnace steel production for 1911 over that produced in 1910 was caused by the big decrease in the United States.

In the first years of its development the electric process was considered as a competitor of the crucible process only for making high class steel from scrap iron and scrap steel; but with the successful

Table 1—Yearly Production of Electric-Furnace Steel.

Country	1908			1909			1910			1911			1912
	Production—tons.	No. of furnaces...	Change in production—per cent..	Production—tons.	No. of furnaces...	Change in production—per cent..	First half—tons..	No. of furnaces...	Change in production—per cent..	Production—tons.	No. of furnaces...	Change in production—per cent..	Production.....
Germany and Luxemburg.	19,536	8	....	17,773	8	—9.0	36,188	13	+104.1	60,654	15	+67.8	....
United States	55	1	....	13,762	4	.....	52,141	7	+228.0	29,105	9	—44.2	6,882
Austria-Hungary	4,333	..	....	9,048	..	+109.2	20,028	..	+120.8	22,867	10	+14.0	.....
France	2,686	7	....	6,515	12	+127.6	13,445	21	—106.2	13,850	21	+ 3.0	7,920
Sweden	.....	..	....	591	11	.....	431	12	— 27.0	2,034	13	+72.0	.....
Norway	.....	..	....	.....	..	.....	.....	1	.....	.....	1	.....	.....
England	.....	..	....	.....	..	.....	.....	..	.....	.....	12	.....	.....
Italy	.....	..	....	.....	5	.....	.....	2	.....	.....	4	.....	.....
Switzerland	.....	..	....	.....	..	.....	.....	..	.....	.....	2	.....	.....
Belgium	.....	..	....	.....	..	.....	.....	..	.....	.....	2	.....	.....
Russia	.....	..	....	.....	..	.....	.....	..	.....	.....	1	.....	.....
Total	26,610	16	....	47,039	40	+ 78.2	120,116	56	+155.4	126,476	90	5,22	.....

operation of larger furnaces the electric process is likely to become an important adjunct to the Bessemer and open-hearth processes as a means of super-refining the molten products that they yield. The electric process, however, does not appear to be destined to supersede either of these methods, as greater efficiency and economy are obtained by a combination of any two of the three processes as a duplex process. The success of recent experiments has obtained for the electric process a definite place as a super-refining method. In time preliminary refining will probably be done mainly in the Bessemer converter, the process being finished in the electric furnace or the open hearth. In Europe the electric-furnace process for making steel of the highest grades is rapidly superseding the old crucible method, because of its greater economy of operation and the possibility of using materials of lower grade.

Copper. So far as we are aware, no copper ores are being treated at the present time in the electric furnace in this country. It is reported, however, that in Norway trial smeltings of copper ores with an electric furnace of 1000 horsepower and an estimated producing capacity of 2000 tons per annum have been conducted at the Ilen Smelting Works, Trondhjen, and we understand that it is the intention to smelt copper ores regularly at this plant in the electric furnace.

More or less experimental work has been done upon the subject, and, as a result of this work and reasoning by analogy, there seems no good reason why copper-bearing ores cannot be as successfully treated in an electric furnace as in a combustion furnace. In all furnaces of the latter class which are used for this treatment of copper ores the fuel used takes no part in the reactions which are necessary for obtaining the desired product, unless it be in the reduction of oxide ores which are smelted alone, that is, without an admixture of sulphides, which is practically an unheard of thing in this country at the present time. For example, in the reverberatory furnace the fuel acts only as a heating agent; in blast furnace smelting, if what is known as ordinary blast furnace smelting is used, the coke added to the charge is for the purpose of supplying the heat necessary to raise the charge to such a temperature as will permit of the necessary reactions between the oxides, sulphates and sulphides present, and to scorify the resultant mass and thus permit of the separation of the slag and matte. In semi-pyritic and pyritic smelting the necessary oxidation of the sulphides and iron is brought about by the oxygen of the air entering the tuyeres, and the coke used is simply for the purpose of supplying the amount of heat necessary for the successful carrying out of the process, which is not supplied by the oxidation of the sulphur and the iron present in the charge at the time it passes through the tuyere zone of the furnace. Such being the case, there seems to be no reason why the smelting of copper ores could not be done as well by electric heat as by that derived from the combustion of coke, especially if local conditions warrant it. The writers, as a result of experimental work which they have done in connection with tests which have been made by the U. S. Bureau of Mines, and likewise judging from results which have been obtained by others, believe that it is perfectly feasible both metallurgically and commercially (the latter, of course, depending upon local condition) to use the electric furnace for the smelting of copper ores.

Zinc. Although, as previously stated, more progress has been made to date in the electric smelting of zinc ores than with the electric smelting of any of the non-ferrous metals except aluminum and metals forming ferro-alloys such as silicon, chromium and tungsten, nevertheless the process is still largely in the experimental stage. There is no plant operating on a commercial scale except the Trollhattan works taking from 10,000 to 13,000 h.p. There are about 24 furnaces installed at this plant, each requiring from 400 to 1200 h.p. The same company, the Norse Power and Smelting Syndicate, also has a smaller plant near Trollhattan at Sarpsborg, where there are seven small furnaces. One other small commercial plant is in course of erection at Keokuk, Iowa, by the Johnson Electric Smelting Company. It appears that the experiments conducted at Hartford, Connecticut, for several years have proven successful enough to warrant the installation of a small commercial unit to test the process further. The Johnson process and the Trollhattan process are essentially the same. Johnson claims to have overcome the problem of condensation of zinc vapor into zinc instead of blue powder.

From the work at Trollhattan and the results of others it is evident that the difficulty in electric smelting of zinc ores almost entirely lies in condensation of zinc vapor to a metal rather than blue powder under the peculiar conditions of the electric furnace. The electric furnace, mechanically or electrically, presents no great difficulties to solve, because all of the troubles formerly experienced have been solved in the construction of large pig iron, steel, carbide and ferro-alloy furnaces. The problem then is one of a metallurgical nature, and is caused by the different conditions and greater speed of smelting in the electric furnace than in the combustion retort.

The solution of this problem is very probable, and, while it is difficult, there is no reason why it should not be worked out in time. When this is solved, and it is not necessary to resmelt a large proportion of blue powder as at Trollhattan, where two tons of blue powder are smelted for each ton of ore treated, it is probable that electric smelting will proceed rapidly in favorable localities. The use of iron as a desulphurizing agent does not seem to have advanced as far as the reduction of oxide with carbon, and it is probable that the latter will keep its present supremacy.

A man's efficiency, as a machine, is about 8 per cent, assuming that the food consumed daily has a calorific value of 4 kw.-hr. Twenty-four men working a treadmill in one-hour relays could drive a 0.2 kw. dynamo capable of supplying eight 25-watt tungsten lamps. If each man were paid a dollar a day their wages would amount to $5.00 per kw.-hr. of output from the dynamo.

STANDARD ACCOUNTING METHODS.

BY EDWARD N. HURLEY.

(This excerpt from an address on "Trade Associations and Better Business Methods," before the Boston Commercial Club, March 28, 1916, is particularly applicable to the electrical industry. It applies as well to jobbers, contractors and dealers as to manufacturers. The author is vice-chairman of the Federal Trade Commission.—The Editor.)

When business was done on a large percentage of profit, questions of accurate cost and of operating efficiency were not so important, but in most lines of industry today the large percentage of profit has passed. Manufacturers are working on smaller margins and must absolutely know what their goods cost. With margins of profit so close, any unreliable method of arriving at cost of production must be eliminated.

It is a fact well understood among business men that the general demoralization in a large number of industries has been caused by firms who cut prices not knowing what their goods actually cost to manufacture, and the cost of selling, which is equally important, is almost wholly lost sight of. **Are the officers of the companies who are cutting prices right and left irrespective of their costs, fair to their customers, stockholders or competitors?**

A manufacturer who does not know with a close degree of accuracy what it costs him to produce the different articles he manufactures and what it costs him to sell them, is not in a position to meet intelligently competition and invites business disaster.

The Federal Trade Commission has been in existence one year and after surveying the field we found from preliminary investigation that 200,000 corporations out of a total of 260,000 engaged in the manufacturing and mercantile business of the United States were eking out an existence; 100,000 of them did not earn a penny. Out of 60,000 successful corporations doing a business of $100,000 a year over 30,000 charged off no depreciation whatever. Only 10 per cent of our manufacturers and merchants know the actual cost to manufacture and sell their products; 40 per cent estimate what their costs are, and 50 per cent have no method but price their goods arbitrarily. Most of the manufacturers and merchants who do not know what their goods cost are basing their selling price on what their competitors sell for and with only this knowledge for a basis they are frequently cutting prices and demoralizing the industry in which they are engaged.

There were over 22,000 business failures in the United States last year; more than 20,000 of them were small concerns. We all know that a large percentage of business is run at loose ends, haphazard and without the proprietors really knowing at any time how they stand or whether they are making a profit or a loss.

Many of the larger manufacturers have thorough cost accounting systems, which they recognize as necessary in order to give them the information essential to successful management. On the other hand, the number of small manufacturers who have no adequate cost accounting system and who price their goods arbitrarily is amazing.

Proper accounting for the smaller manufacturer is most essential. It is necessary for his success that he know on what particular article he is making a fair profit and on what he is making only a narrow margin of profit or losing money. If he has this information he can concentrate on the manufacture and sale of the product on which the profits are satisfactory.

Whole industries, in many instances, are suffering from a general lack of intelligent knowledge of cost.

How can the Federal Trade Commission help to improve this situation?

The commission has no intention and no desire to use compulsory methods. But it does hope to reach the desired end by encouraging improvements in accounting practice, by indorsing standard systems of bookkeeping and cost accounting, and by assisting in devising standard systems, either at the request of individual merchants and manufacturers, or through the association that represents the industry.

The metric system of weights and measures will be used exclusively in the revised edition of the U. S. Pharmacopoeia, the standard reference of the medical and drug profession. As an aid in this transition from the customary system the U. S. Bureau of Standards is preparing a circular on weights and measures for the pharmacist and physician.

An artificial eye has been devised by Ives and Kingsbury in the form of a thermopile whose readings indicate the intensity of luminous radiations with a precision better than one per cent. Non-luminous radiations are screened out. This instrument is capable of measuring color differences as accurately as is done by the methods of visual colored light photometry. This instrument shows that one lumen corresponds to 0.00159 watt of luminous flux.

A co-operative electric range sales campaign has been started by the Puget Sound Traction, Light & Power Company, under the direction of H. J. Gille, sales manager. A stock of each manufacturer's ranges will be carried by a local jobber who will resell to the central station and will otherwise act as the manufacturer's agent. The employment and direction of the salesmen will be done by the central station, as will also be the working out of the sales campaign details. The plan provides for the employment of four salesmen to represent each manufacturer's product exclusively. These men will receive a commission of 10 per cent of the net price on each range sold, and will be guaranteed a minimum of $75 per month. The deficit, if any, between the monthly commission totals and the seventy-five-dollar minimum is to be divided evenly between the central station and the manufacturer. A certain amount of general advertising will be done by the manufacturer, and the central station will carry on an advertising campaign and will furnish all necessary facilities for suitable demonstrations, etc.

JOURNAL OF ELECTRICITY
POWER AND GAS

FOUNDED 1887

PUBLISHED WEEKLY BY THE

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION ETC., required by the Act of Congress of August 24, 1912, of "Journal of Electricity, Power and Gas," published weekly at San Francisco, for April 1, 1916.

State of California,

County of San Francisco—ss.

Before me, a Notary Public in and for the state and county aforesaid, personally appeared Edward B. Strong, who, having been duly sworn according to law, deposes and says that he is the business manager of the "Journal of Electricity, Power and Gas," and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Names of	Post Office Address.
Publisher, Technical Publishing Company	San Francisco, Cal.
Editor, A. H. Halloran	No. 6 Crossley Bldg., San Francisco
Managing Editor, A. H. Halloran	No. 6 Crossley Bldg., San Francisco
Business Manager, E. B. Strong	No. 6 Crossley Bldg., San Francisco

2. That the owners are:

E. B. Strong	San Rafael, Cal.
R. J. Davis	Berkeley, Cal
A. H. Halloran	No. 6 Crossley Bldg., San Francisco
C. L. Cory	Nevada Bank Bldg., San Francisco
Robert Sibley	Berkeley, Cal
Mrs. L. B. Storey	Chicago, Ill.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustees or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

E. B. STRONG, President.

Sworn to and subscribed before me this 31st day of March, 1916.

(Seal) CHARLES EDELMAN,

(My commission expires April 7, 1918.)

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Better Lighting

As a result of the demand for more light, the deficiency has been supplied by increased lamp efficiency and greater sales proficiency. There is now more light everywhere. In some places there is more than enough. For, as regards lights, too much seems as bad as too little.

This undesirable excess of light is technically known as glare, and is defined as such excessive brightness within the field of view as to cause discomfort, annoyance or interference with vision. So there is now arising a counter-demand for the elimination of glare, with consequent call upon engineering efficiency and sales proficiency to supply the deficiency. Thus is the cycle repeated and so will it be repeated until progress shall be no more.

The first tangible evidence of the campaign to minimize glare has been on the public streets, where the evil was most glaring. This came in response to safety first requirements. Headlights on automobiles and street cars must now be dimmed to make street traffic safe. The latest types of arc lamps for street purposes employ diffusing glassware. There are even a few merchants who realize that glaring store-window lighting destroys confidence. Trade follows light used judiciously, but avoids the dazzling and the blinding. Judging from appearances, moths are the chief buyers of cheap jewelry.

As the undesirable glare of the streets is in process of correction it is high time to conserve vision in the home. The glare of interior lighting, while less intense, is more enduring than the glare of exterior illumination. This subject has recently been studied by the committee of the Illuminating Engineering Society which has arrived at tentative figures indicating safe limits for contrast of brightness within the range of vision.

Suggestions are made for distributing brightness not only from lighting equipment but also from ceilings, walls, paper and desks. It is found that eye fatigue is produced by contrasts in lighting. Consequently it is suggested, as the results of experiments, that the ratio between the brightness of a light and the darkness of a non-luminous surface should not be greater than 100 to 1. Practically speaking this means that dark-colored walls call for less brilliant light sources than white walls, the proper quantity of light being obtained by increasing the number of light sources. These suggestions should be kept in mind when planning the illumination of interiors and should also be applied to those interiors where light causes discomfort to the eye. Thus will we have not only more light but better light.

The Need for Teaching the Dealer

The most vital task before the electrical men of the West today is that of getting more current-consuming devices on existing lines. The success that has already been achieved in this regard is only indicative of what remains to be done. The greatest obstacle in the way of greater achievement is the ignorance of electrical men themselves about what can be done electrically.

A specific citation is pertinent. The other day a power salesman visited an electric shop in one of the

big cities. An electric range was on the floor. The proprietor was asked a few leading questions about the purpose, current consumption and advantages of this device, none of which he could answer. He only knew that the jobber had consigned the range to him for demonstration purposes. He thought that rates were too high in his community to make electric cooking attractive to the housewife. This is a true story, nor is it an isolated instance.

Before starting any campaign to educate the public about the advantages of electric cooking it is first necessary to teach the dealer. The dealer can then teach and encourage the would-be purchasers, instead of discouraging them. An educative campaign among the dealers is a necessary preliminary to any sales effort direct to the consumer.

Lectures, demonstrations and articles in periodicals read by electrical dealers are essential. It is useless to make a sale which is later to be killed by an ignorant dealer. When dealers understand the capabilities of appliances their intelligent co-operation will do more to put electrical devices on lines than any amount of house-to-house canvassing by central station solicitors.

The fault lies not so much with the dealer as with the manufacturer and the central station. They seem to have overlooked the capability of the dealer as a load-builder. In the haste to erect a superstructure the foundation has been neglected. A part of this teaching task has been voluntarily assumed by the jobber. He needs help and co-operation from both the manufacturer and the central station if his educative campaign is to be carried to the final fruition of better business for every branch of the industry.

Now, to be specific, let an active committee on the education of electrical dealers be created by the National Electric Light Association, the Associated Electrical Manufacturers and the Electrical Supply Jobbers' Association. Each association is carrying on more or less educational work among the employees of its members and is talking about educating the consumer, but is neglecting the education of the dealer. The future of the electrical business depends upon the intelligence of the electrical dealer, the merchant who sells to the consumer. Instead of arguing and fighting as to whether appliances be sold by the manufacturers, the jobber or the central station, it behooves all of them to get together to teach the dealer.

The Technical Journal as a Catalytic

In chemistry, a catalytic is an agent that brings about a change in a compound while itself remaining unchanged. Thus cane-sugar and water are changed into glucose by the action of sulphuric acid, which is itself unchanged and ready to perform a similar function indefinitely. The mere presence of such an extra substance accelerates chemical change as may be seen by putting a piece of platinum into a mixture of hydrogen and oxygen to form water, or by adding manganese dioxide to heated potassium chlorate to liberate oxygen. A minute amount of material, which adds little or no energy to the reaction, is thus able to bring about tremendous changes.

Such, modestly speaking, is the function of a technical paper. It is the agent whereby men's thoughts are brought into contact and allowed to react upon each other. It is a means to the end of hastening industrial advance.

In order to effectively fulfill this contactor function the journal should be freely furnished with the ideas of the men in the industry. They should regard the journal as employed by them to bring about necessary changes in the business, to stimulate reaction and accelerate progress.

No matter what the difficulty,—whether technical in nature and involving unprecedented construction, whether commercial in character and calling for new sales methods, or whether of a sociological kind and tending toward the establishment of better public relations,—it can be best met by an exchange of experiences. Mouth-to-mouth exchange of experience is as limited in scope and inefficient in action as would be dependence upon gold or silver coin as a medium of financial exchange. Just as credit has replaced coin and the clearing-house the individual bank, so the technical journal is available as an active clearing-house of experience.

No editorial staff can be everywhere simultaneously, know everything instinctively and see everything at once. The reader's assistance is needed. The ideal technical journal is one where every reader is a contributor. If every subscriber sent in the news of his job every other subscriber would be benefitted. The perfect journal is one in which a reciprocal relation exists between the subscriber and the paper. In order that a magazine may be the voice of an industry the reader should be the eye and ear.

In this respect, the technical journal is a quasi-public utility. Its private ownership is as incidental to the public service as is the private ownership of an electric power company. Experience has demonstrated that such matters can be more effectively conducted by private initiative supplemented by public participation. There is no other means which so adequately and promptly fulfills the requirements for disseminating information as the technical journal.

The editor's duty is to serve the industry which his paper represents. No matter how strong his imagination and how great his ability in thinking of different ways of helping people, he is in a large measure dependent upon the subscriber's assistance.

So, respected reader, we make an earnest plea for your more active participation in the benefits which this journal is capable of conferring upon you. Have you found a better method of cost accounting? Send it to the editor. Are you using a new kink in construction or operation? Share it with others. Is there some question about which you are in doubt? Ask the opinion of those who have already solved it. Have you done something of which you are proud? Let others know of it. Any article, however brief, is welcome if it helps the reader.

A journal is like an association in that the reader gets out of it directly as he contributes to it. The essence of mutual benefit is in reciprocal use. Use the journal as a relay for your ideas, as a clearing-house for your experiences and as a catalyzer of your thoughts. We are then most truly at and in your service.

PERSONALS

Howard N. Place of the Edison Laboratory, New York, is at San Francisco.

M. Fortini, secretary of the Standard Electric Construction Company, is at Los Angeles.

F. F. Bostwick, president National Safety Appliance Company of San Francisco, is at Oroville, Cal.

Albert Meinema, city sales manager of the Electric Appliance Company at San Francisco, is at Chicago.

J. Q. Brown, general manager of the Nevada Valleys Power Company, spent last week at San Francisco.

N. K. Cooper, sales manager with the Westinghouse Electric & Manufacturing Company, is at Tonopah, Nevada.

A. Emery Wishon, assistant general manager of the San Joaquin Light & Power Company, is at San Francisco.

W. D. Kohlwey of the firm of Kohlwey, Smith & Alfs, recently returned to San Francisco from Los Angeles.

H. P. Pitts, industrial engineer Pacific Gas & Electric Company, is making a trip through the Pacific Northwest.

S. B. Gregory, Pacific Coast manager Arrow Electric Company, is recovering from an attack of tonsilitis at Seattle.

C. R. Hunt of Robbins & Myers, has returned to San Francisco from Seattle, Spokane, Tacoma, Walla Walla and Portland.

D. P. Fullerton, general superintendent of plant of the Pacific Telephone & Telegraph Company, spent a few days in Chico last week.

A. M. Irwin, assistant to the treasurer of the Westinghouse Electric & Manufacturing Company, has returned to San Francisco from Los Angeles.

H. R. Noack, president of the Pierson-Roeding Company, has returned to San Francisco from a very interesting auto trip through Amador county.

S. K. Colby, assistant general manager of the Aluminum Company of America, who has spent the last couple of weeks on the Coast, has recently returned East.

R. B. Mateer, commercial manager of the Southern Sierras Power Company at Riverside, Cal., has been called to Altoona, Pa., by the death of his father.

H. E. Sanderson, Pacific Coast manager Bryant Electric Company, has returned to San Francisco from a short business trip through the Northwest territory.

H. F. Schottler, Pacific Coast representative of the Gorham Fire Apparatus Company, San Francisco, has returned from a short trip in the Sacramento Valley.

E. Newman has charge of the construction work which has been resumed by the San Joaquin Light & Power Corporation on its No. 2 Plant at North Fork, Cal.

W. B. Thomas, formerly salesman with the Fobes Supply Company at Seattle, is now on the sales force of the Electric Appliance Company at San Francisco.

Chas. N. Black, vice-president of the United Railroads, went as far as Panama on Captain Jackling's yacht. Mr. Black arrived at New York on the 6th of this month.

H. B. Squires, Pacific Coast agent for the Cutler-Hammer Manufacturing Company and National India Rubber Company, has returned to San Francisco from Portland and Seattle.

Geo. E. McFarland, president, **and H. D. Pillsbury,** vice-president of the Pacific Telephone & Telegraph Company, have returned to San Francisco from a short trip to Los Angeles.

E. C. Wilson of the Great Western Power Company at Oakland, Cal., has been made chairman of the committee on electrical features for the Motor Power Show to be held at Oakland, April 26-May 6.

Frank H. Stone, formerly San Francisco salesman for the General Electric Company, and Pacific States Electric Company, has become a partner in the firm of Leedke & Stone, general tours and steamship agents.

C. V. Schneider, president of the California Association of Electrical Contractors, and **Frank Somers** of the Century Electric Company of San Jose, attended the quarterly meeting of the association at Oakland this week.

H. J. Kennedy, electrical engineer, formerly located at Seattle, where he had charge of the design and construction of the municipal railway, is now at New York City, where he is interesting financial men in Western projects requiring capital.

MEETING NOTICES.

Electrical Development and Jovian League.

J. B. Carlson, manager of the Central Electric Company, as chairman of the March 29th meeting, provided a most interesting speaker in Supervisor J. Emmet Hayden, who gave an interesting account of a trip through Mexico, his remarks being illustrated with a large number of beautiful lantern slides. Miss Ethel Cotton also gave a number of clever character impersonations and anecdotes. Great interest is being manifested in the Jovian Smoker to be held at the Hotel Sutter during the evening of April 14th.

Oakland Jovian Club.

At a meeting of a number of electrical men at the Commercial Club in Oakland on April 1st, it was decided to form the "Oakland Jovian Club." Tribunes F. H. Woodward and B. C. Hill were elected president and vice-president respectively, and A. H. Nylen, secretary. Meetings will be held monthly at Saturday lunches and discussions be confined primarily to matters of electrical interest. Membership is open to any electrical man whether a member of the Jovian Order or not. E. C. Wilson of the Great Western Power Company briefly explained the electrical features of the Motor Power Show to be held at Oakland April 26-May 6th.

Joint Meeting Portland Sections A. I. E. E. and N. E. L. A.

The next regular joint meeting will be held at 8:15 p. m., April 11th, in the Electric Building, Portland, Oregon. The paper of the evening will be presented by M. E. Cheney, E. E., of the Washington Surveying & Rating Bureau, of Seattle, Washington. His subject will be "A Scientific Method of Compiling the Fire Insurance Rates in Public Utility Properties."

The regular bi-monthly luncheon club of the local section was held at the Portland Commercial Club Thursday noon, March 30th. C. C. Chapman made a talk on "Legislation." A. C. MacMicken acted as chairman. Attendance 40. The speaker of the meeting on April 13th will be W. D. Wheelwright and the chairman of the day will be W. D. Spencer.

San Francisco Section A. I. E. E.

The regular monthly meeting of the San Francisco Section of the American Institute of Electrical Engineers was held at the Engineers' Club on March 31st. A communication from Professor J. G. Scrugham, Dean of the College of Engineering, University of Nevada, regarding the Newlands Bill establishing a fund for engineering research in land grant colleges was read and discussed in detail by C. L. Cory. Communication was also read from the secretry of the local section of mining engineers requesting co-operation between the several local engineering societies, this matter being endorsed. Professor Harris J. Ryan of Stanford University then discussed "Transmission Line and Insulator Losses at extremely high voltages," his talk being illustrated by lantern slides. After briefly describing the new laboratory equipment at Stanford University, whereby it is possible to get and experiment with 350,000 volt current at high frequencies, he talked of results obtained in testing the resistance and flash-

over on various insulators. These detailed results will be the subject of a paper to be published in these columns at an early date. The paper was briefly discussed by J. E. Woodbridge, J. P. Jollyman, C. L. Cory and A. H. Babcock, the chairman of the section.

Los Angeles Jovian League.

Colonel Tom Prior, known as the Amusement King of Venice, and for several decades identified in various capacities with large amusement enterprises throughout the country, was the principal speaker at the meeting Wednesday, March 29th. Col. Prior in a very amusing and entertaining talk entitled "Amusing the Common People for Cash," kept the Jovians in a continual uproar with humorous stories, anecdotes and reminiscences of famous actors and actresses with whom he associated in his early theatrical days, when he was manager of the old Chicago Opera House. A feature of the musical part of the entertainment, deserving special mention, was the singing of Miss June Boggs, soprano, who is with the Southern California Gas Company. Her artistic rendition of several semi-classical ballads was a real musical treat. Paul D. Howse, general manager of The Electrical Products Corporation, as chairman of the day, was responsible for the program, which was one of the most interesting of the year.

AMERICA'S ELECTRICAL WEEK POSTER COMPETITION.

Two thousand dollars in prizes is offered by the Society for Electrical Development, 29 West Thirty-ninth street, New York, in a contest to secure an appropriate poster design for America's Electrical Week, the nation-wide trade movement to be held by the united electrical interests from December 2d to 9th. The competition began April 1st and will close June 1, 1916. The design must not only embody the element of beauty but must carry an appeal, a message striking and convincing, visualizing the triumphs of electricity and its rapid progress in the upbuilding of industrial, commercial and domestic efficiency.

The prizes offered include (A) $1000 grand prize, (B) $300 second prize, (C) $300 public choice prize, (D) $200 art students' prize (E) $200 school prizes.

Certain conditions, rules and requirements must be complied with by all competitors. A copy of these may be secured from the Society for Electrical Development. The judges who will decide upon the merits of the various designs and award the prizes are as follows: John Quincy Adams, secretary, Municipal Art Commissions; James P. Haney, art director of New York High Schools; Arthur W. Wiener, president, International Art Service; Herbert F. Houston, president, Associated Advertising Clubs of the World; P. L. Thompson, advertising manager, Western Electric Company; Henry L. Doherty, president, The Society for Electrical Development, Inc.

The committee in executive charge of the competition is as follows: Frank H. Gale, General Electric Company; J. C. McQuiston, Westinghouse Electric & Manufacturing Company; E. W. Rockafellow, Western Electric Company; George Williams, Henry L. Doherty & Company, Bankers, executive staff, Society for Electrical Development, Inc.

CIVIL SERVICE EXAMINATION.

The United States Civil Service Commission announces an open competitive examination for laboratorian, for men only, on May 3, 1916, to fill a vacancy in the position of laboratorian at $3.60 per diem in the machinery division of the Navy Yard, Mare Island, Cal., and vacancies as they may occur in positions requiring similar qualifications at any navy yard or other naval establishment of the United States, or in the Department at Washington, D. C.

TRADE NOTES.

The Mechanical Installation Company of San Francisco has completed a wireless contract on the wrecking-steamer "Greenwood."

The Weidel Electric Company has taken the J. B. Reite wiring contract on Mission street, between Fifth and Sixth streets, San Francisco.

The Thornberg Electric Company of San Francisco has taken a contract for wiring and apparatus of the Rainier Brewery, San Francisco.

M. C. Baker & Son of San Francisco have secured the wiring contract for the Peck & Hill Furniture Company and also Weeks, Howe, Emerson's new store.

The Standard Electrical Construction Company of San Francisco has received the wiring contract for the addition to the Standard Oil Company's building, out of P. J. Walker's office.

Construction of the two new stations of the Pacific Gas & Electric Company, Nos. 4 and 5, at Clipper Gap and near Auburn, will be the means of employing at least four hundred men this summer.

The Electric Material Company, 589-91 Howard street, San Francisco, is now representing the G. & W. Specialty Company, conveying cable, pot heads, disconnecting devices and insulating compound.

The National Electric Company of San Francisco has taken two apartment house wiring and fixture contracts, one on Van Ness avenue and Vallejo street and the other on Jackson and Leavenworth streets, San Francisco.

The name of the Kohlwey Light Company of 237 Powell street, San Francisco, has been changed to Kohlwey, Smith & Alfs Electrical Company. Mr. Smith was with the Electric Motor & Machine Company; Mr. Alfs was an electrical engineer.

The General Acoustic Company has installed a complete dictograph system in the New City Hall of San Francisco, consisting of eight executive or master stations or controls and seventy-six substations. This company has also installed forty-five intercommunicating substations or telephones for Dunham, Carrigan & Hayden Company.

The Novelty Electric Sign Company of San Francisco, owing to new and larger business, are making window and office changes. They have recently taken electric animated sign contracts for the Rialto Theatre, Royal Theatre, New Mission Theatre, Clinton Cafeteria, Marine Grotto, United Cigar Store and the Pioneer Brewery Company.

The Cab Signal and Train Control System, manufactured by the National Safety Appliance Company, has been installed on several miles of Western Pacific tracks on the Oroville division and twenty engines of the company have been equipped and placed in operation with the signal system on March 6th. This is the result of a successful demonstration of the efficiency of this system made some time ago.

The "Ironclad-Exide" battery, now in its sixth year of successful service, has again been improved by an air-tight cell cover and filing plug construction which has many distinct advantages. This new cover construction prevents dust or other impurities from getting into a cell. The cover is flush with the top of the jar leaving no space for the collection of moisture or dust. It limits the amount of water that can be put into a cell to the exact amount needed to replace that lost by evaporation and keeps the battery dry, overcoming the slopping and spilling of electrolyte, and thus eliminates short circuiting, rotting of battery trays and corrosion of metal parts. The filling plug can be loosened and removed or replaced and tightened by only a quarter turn. Sealing nuts on the terminal posts hold the cover firmly in place, while the use of rubber washers around the posts makes it, (the cover), air tight.

NEWS NOTES

INCORPORATIONS.

SKAMOKAWA, WASH.—The Wahkiakum County Co-operative Telephone & Telegraph Company has been incorporated here.

CARSON CITY, NEV.—The State Electrical Company has been incorporated here with a capital stock of $1,000,000, by Wm. Muller, P. E. and J. G. Ellis.

MODESTO, CAL.—The Modesto Gas Company has been incorporated with a capital stock of $100,000 by C. J. Cressey, A. B. Shoemaker, W. A. Harter, J. S. Tully et al.

OTHELLO, WASH.—Application for letters of incorporation has been filed with the secretary of state by the Farmers' and Merchants' Telephone Company, an Othello organization that proposes to build a line from Othello to Cunningham to connect with the Bell system. Applications will also be made for installing a telephone exchange in Othello.

FLORENCE, ARIZ.—The Consolidated Florence-Casa Grande Water Company has been organized with a capital stock of $250,000. The purpose of the organization is to build a diversion dam on Gila River and to construct a canal to divert water to a point accessible to the existing canal systems. The incorporators are: A. E. Vinson, J. F. O'Connor, W. J. Schultze, F. G. White, J. J. Fraser, Dugald Stewart, Chas. Stewart, H. H. Freeman, W. S. Prouty, J. F. Brown, Archie Ryan, Amandus Peters, G. W. Burgess and W. Y. Price.

ILLUMINATION.

HAILEY, IDAHO.—The new street lighting contract requires the immediate installation of a new lighting system that will cost $7000.

WALDPORT, ORE.—An ordinance has been passed by the city council granting a franchise to L. H. Evans, to construct and operate an electric light and power plant.

SOCORRO, N. M.—The Magdalena Lighting Company's plant has been sold by order of the district court to George Keith and Ed. Wayne of Socorro, for $10,000.

COLFAX, WASH.—A movement is under way to incorporate a water and light company in Ewan to take over the present light plant, and to lay water mains over the town.

PASADENA, CAL.—The contract for installing ornamental lighting posts on Bellevue Drive have been awarded by the city commission to W. A. McNally & Company at $1840.

LOS ANGELES, CAL.—The supervisors have adopted specifications for additional lights in the Westgate district, and bids will be received up to April 10th for the proposed improvement.

MODESTO, CAL.—Sealed bids will be received by the city clerk up to April 11th for furnishing the necessary appliances and electricity required for lighting streets, etc., of the Denair Lighting District for a term of five years.

LOS ANGELES, CAL.—The city council has authorized the board of public works to issue a permit to E. L. Doheny and other property owners to erect, by private contract, ornamental electric light poles along West Adams street, between Figueroa and Hoover streets.

CENTRALIA, WASH.—Charles A. Harmony, who has purchased the properties of the Shelton Electric Company at Shelton, for five years was city electrician in Centralia. After that he was district superintendent of the Washington-Oregon Corporation, now the North Coast Power Company, with headquarters in this city. He has had wide experience in electrical work.

OREGON CITY, ORE.—A special meeting of the city council to be devoted entirely to discussion of the practicability of a municipal light and power plant, operated by power from the falls, is being considered by Mayor Hackett. Mayor Hackett urges that the city not only generate electricity for street lighting, but also enter into the commercial light and power business. One of the provisions of the agreement between the Hawley Pulp & Paper Company and the city is that the city shall have sufficient room in the new Hawley mill to install generators with a capacity of developing 5000 h.p. water wheels, pumps and other machinery. The city has title to water power at the falls and could secure additional rights by condemnation, according to local attorneys. The only factor that makes Mayor Hackett hesitate in advocating unconditionally the construction of a municipal power plant is the financial condition of the city. The city at present is paying more than $4000 a year for street lighting alone.

TRANSMISSION.

RIDDLE, ORE.—An ordinance has been passed by the council granting to A. E. Brais a franchise to construct a pole and wire line and underground conduits for distributing electric energy and power in the city of Riddle. A 250 h.p. plant is contemplated.

MADERA, CAL.—Extensions amounting to over $20,000 are being made by the San Joaquin Light & Power Company in the Raymond, Knowles and Coarse Gold districts of Madera county. Two new substations are being put in by the company, one at Knowles and one at Coarse Gold. Each substation will handle 30,000 volts. The Coarse Gold station is being put in for the operation of the mines, and will, it is expected, in the near future, also serve the town of Coarse Gold. The Knowles sub-station will serve the quarries, and a 10,000 volt line is being run to Raymond to serve the town, which has never had electric lights or power.

TRANSPORTATION.

POCATELLO, IDAHO.—The city council has granted the Pocatello Traction & Interurban Company a franchise to construct street railway.

LOS ANGELES, CAL.—An extension of the Pacific Electric tracks from Claremont to Uplands, a distance of a mile and a half, has been announced by officials of the road.

BOISE, IDAHO.—An electric railroad from Boise to Bruneau and Wickahoney is a probability now, as a movement is under way to organize a company to construct the road.

PENDLETON, ORE.—An electric road from Pendleton to Walla Walla and from Cold Springs through Pendleton to Bingham Springs is an undertaking projected by an association of capitalists represented by C. W. Lefler. It is understood that E. W. McComas of Pendleton is connected with the undertaking.

ALBUQUERQUE, N. M.—Residents and property owners on Duranes boulevard, extending north from this city, want the City Electric Company to build an extension during the coming summer. North Fourth street property owners are also seeking trolley service. The company is ready to extend its line on one of these streets, but does not deem it advisable to undertake both extensions at the same time.

RED LODGE, MONT.—Plans for the construction of an electric railroad between Red Lodge and Bear Creek and Red Lodge and Columbus were received at a recent meeting of the chamber of commerce, when W. E. Hymer announced that D. E. Thompson of Lincoln, Neb., who is interested in the project, is expected here shortly for the purpose of looking over the country. A committee consisting of Chas. H. Draper, Geo. A. Jeffery, R. G. Wiggenborn and others was appointed to confer with Mr. Thompson when he arrives.